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McDERMOTT, WILL & EMERY
600 13th Street NW
Washington, DC 20005-3096

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 10

Application Number: 09/702,667
Filing Date: 11/01/00
Appellant(s): MUNTEANU ET AL.

Arthur J. Steiner
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed July 30, 2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellants' statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellants' statement of the issues in the brief is substantially correct. The changes are as follows:

- The rejections of claims 1, 7 and 8 under 35 U.S.C. 102(b) for lack of novelty as evidenced by Ohkijima et al. has been further clarified that appellants admissions are relied upon in an evidentiary manner as clearly stated in the rejection of record.
- The rejection of claim 9 under 35 U.S.C. 103(a) for obviousness predicated upon Ohkijima et al. has been withdrawn.
- The rejection of claim 9 under 35 U.S.C. 103(a) for obviousness predicated upon Moroishi et al. and Zhang et al. has been withdrawn.
- The rejection of claims 3 and 4 under 35 U.S.C. 103(a) for obviousness predicated upon Moroishi et al. in view of Miyazaki et al., Zhang et al., Yoshikawa et al., the acknowledged prior art, Song et al. and Bian et al. has been withdrawn.
- Claims 3, 4 and 9 now stand objected to as being dependent upon a rejected base claim.

(7) Grouping of Claims

The appellants' statement in the brief that certain claims do not stand or fall together is not agreed with because appellants have included the same claims in multiple groups and it is noted that both groups are stated to alternatively stand or fall together as a group with independent claim 1.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,736,262	OHKIJIMA ET AL.	4-1998
5,900,324	MOROISHI ET AL.	5-1999
5,558,945	MIYAZAKI ET AL.	9-1996
6,274,233	YOSHIKAWA ET AL.	8-2001
6,156,404	ROSS ET AL.	12-2000

Zhang, B., Bennett, W., Gao, C., Rauch, G., and Blachere, J., "CoCrTa/CoCrPtTa Double-Layer Films for Magnetic Recording" IEEE Trans. Mag., vol32, no. 5 (Sept. 1996), pp. 3590 - 3592.

Song, L, Gardner, R., McLaurin, S., and Sedighi, M. "Magnetic Properties and Recording Performance of Multilayer Films of CoCrTa, CoCrPtTa, and CoCrPtTa with CoCrPtB" IEEE Trans. Mag., vol.30, no. 6 (Nov. 1994), pp. 4011 - 4013.

applicants admitted prior art (specification pages 1 - 5)

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 7 and 8 stand rejected under 35 U.S.C. 102(b) as being anticipated by Ohkijima et al. (U.S. Patent No. 5,736,262) as evidenced by appellants' admissions.

Regarding claims 1 and 7, Ohkijima et al. disclose a magnetic recording medium comprising a non-magnetic substrate (*col. 5, lines 3 – 5*), an underlayer on a non-magnetic substrate (*col. 5, lines 12 – 13*), a magnetic (*col. 4, lines 38 – 40: "a non-magnetic or feebly magnetic", emphasis added; and examples*) intermediate layer (i.e. appellants' "first magnetic layer") on the underlayer (*col. 5, lines 17 – 19*) and a second magnetic layer on the intermediate layer (*col. 5, lines 15 – 17*); wherein the second magnetic layer exhibits a higher magnetic saturation (Ms) than the intermediate layer (*col. 1, lines 55 – 63; col. 5, lines 3 – 13; and Table 1; e.g. example 26 which has an intermediate layer with an Ms of 16 (Bs = 4πMs) and a second magnetic layer with an Ms of 438*).

The limitation "the first magnetic layer exhibits a higher signal-to-media noise ratio (SMNR) than the second magnetic layer" is a functional limitation(s). As defined in the MPEP, "[a] functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971)" – MPEP § 2173.05(g). However, the examiner notes that "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an ***inherent characteristic of the prior art***, it possesses the authority to require the applicant to prove that the subject matter shown

to be in the prior art does not possess the characteristics relied on" (emphasis added) - MPEP § 2183.

In the instant case, the claimed property limitation "the first magnetic layer exhibits a higher signal-to-media noise ratio (SMNR) than the second magnetic layer" is deemed a functional limitation(s) and is deemed to be an inherent characteristic of the prior art since the prior art is substantially identical in composition and/or structure. The examiner's sound basis for this assertion is that Ohkijima et al. disclose a prior art product possessing substantially identical structure to the claimed product, i.e. a dual layered structure comprising two Co-alloy layers, each of which are "magnetic", wherein the second layer possesses a higher saturation magnetization than the first layer. In addition, Ohkijima et al. example 26 disclose an embodiment wherein the Cr content in the first layer is greater than the Cr content in the second layer, wherein it is known in the art that a higher Cr content leads to improved SMNR performance (as evidenced by appellants' admissions, page 4, lines 15 – 16).

Therefor, the examiner deems there is sound basis for believing that the functional limitation "the first magnetic layer exhibits a higher signal-to-media-noise ratio (SMNR) than the second magnetic layer" would necessarily flow from the structure embodied by example 26. The Examiner notes that a single example possessing all the claimed limitations is a *prima facie* case of anticipation, even if the disclosed and claimed ranges in the property not be identical. Furthermore, the examiner notes that there is currently no evidence of record showing that the disclosed prior art product (e.g. example 26) does not necessarily meet the claimed functional limitation.

Regarding claim 8, Ohkijima et al. disclose the second layer as directly deposited on the first layer (*col. 5, lines 15 – 19*).

Claims 1 and 5 - 7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Moroishi et al. (U.S. Patent No. 5,900324) in view of Miyazaki et al. (U.S. Patent No. 5,558,945) and Zhang et al. (IEEE Trans. Mag., 32(5), 1996, 3590 – 3592).

Regarding claims 1 and 7, Moroishi et al. disclose a magnetic recording medium comprising a non-magnetic substrate (*Figure 1, element 1*), an underlayer on a non-magnetic substrate (*element 2*), a first magnetic layer on the underlayer (*element 3*) and a second magnetic layer on the first magnetic layer (*element 5 and col. 5, lines 9 – 16*).

While Moroishi et al. disclose the importance of controlling the crystal structure of the magnetic layer directly deposited on the underlayer inorder to reduce the overall medium noise (*col. 2, line 63 bridging col. 3, line 38*), Moroishi et al. fail to disclose the first magnetic layer exhibiting a higher SMNR than the second magnetic layer.

However, Zhang et al. teach a double layered magnetic recording media wherein the "bottom-layer film not only seeds the microstructure for the upper-layer film, but also determines the noise characteristics of the double layer film" (*Abstract*), wherein the preferred structure comprises a first magnetic layer possessing a higher SMNR than the second magnetic layer (*Table 1, Series A and B and Results and Discussion*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Moroishi et al. to utilize a first magnetic layer exhibiting a higher SMNR than the second magnetic layer as taught by

Zhang et al. inorder to reduce the overall medium noise, since the first magnetic layer determines the overall noise characteristics of the double layer film.

Neither Moroishi et al. nor Zhang et al. disclose the second magnetic layer exhibiting a higher Ms than the first magnetic layer.

However, Miyazaki et al. teach a double layered magnetic recording medium wherein the second magnetic layer exhibits a higher Ms than the first magnetic layer (*Abstract and col. 2, lines 42 – 50*) inorder to produce a recording medium possessing good output over a range of low to high density, as well as good still and electromagnetic characteristics (*col. 1, lines 5 – 10 and col. 2, lines 23 – 27*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Moroishi et al. in view of Zhang et al. to utilize a second magnetic layer possessing a higher Ms than the first magnetic layer as taught by Miyazaki et al. inorder to produce a recording medium possessing good output over a range of low to high density, as well as good still and electromagnetic characteristics.

Regarding claim 5, Moroishi et al. disclose underlayers meeting applicants' claimed limitations (*col. 13, lines 18 – 24 and Figure 1*).

Regarding claim 6, Moroishi et al. disclose the first underlayer comprising Cr or any body-centered cubic close-packed crystalline structure (*col. 10, lines 38 – 47; col. 13, lines 18 – 24; and Figure 1*) and the examiner has deemed "Cr" to read on "Cr alloy" given appellants' disclosure regarding suitable composite underlayers comprising a first

Cr alloy layer and second Cr *alloy* layer, wherein Cr is disclosed as suitable for the second underlayer (*specification page 9, lines 5 – 13*).

Claim 2 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Moroishi et al. in view of Miyazaki et al. and Zhang et al. as applied above, and further in view of Yoshikawa et al. (U.S. Patent No. 6,274,233 B1), appellants' admissions and Song et al. (IEEE Trans. Mag., 30(6), 1994, 4011 – 4013).

Moroishi et al. in view of Miyazaki et al. and Zhang et al. is relied upon as described above.

Moroishi et al. in view of Miyazaki et al. and Zhang et al. fail to disclose the alloy compositions for the first and second magnetic layers, as claimed by applicants, though Moroishi et al. do disclose CoCrPt alloys comprising Ta and/or B (*col. 6, lines 1 – 4*).

Regarding the relative Cr content, as stated above, one of ordinary skill would have been motivated to form a first magnetic layer having a higher SMNR than the second magnetic layer. Appellants admit that it is known in the art "to improve SMNR, the chromium (Cr) content is ... increased" (*specification, page 4, lines 15 – 16*). Furthermore, Yoshikawa et al. teach a dual layered magnetic recording medium comprising a first and second magnetic layer containing Co, Cr and Pt (*Table 2, Test Example 37*), wherein the first magnetic layer has a higher Cr content than the second magnetic layer (20% vs. 18%). Yoshikawa et al. disclose that such an embodiment results in the highest SMNR (16.1 dB).

Therefore, the examiner deems that one of ordinary skill in the art at the time of appellants' invention would have been motivated to use a higher Cr content in the first magnetic layer in view of appellants' admissions that increased Cr content results in increased SMNR, as well as the examples in Yoshikawa et al., especially given the teachings of Zhang et al. that the lower magnetic layer controls the overall SMNR properties of the medium.

Regarding the relative Co content, as stated above, one of ordinary skill would have been motivated to form a second magnetic layer having a higher Ms than the first magnetic layer. Appellants admit that it is known in the art that as the cobalt (Co) content is decreased, the Ms is decreased (*specification, page 4, lines 17 – 18*). Furthermore, the disclosed embodiment in Yoshikawa et al. that possesses the highest combined SMNR and coercivity (2820 Oe) is also noted to possess a higher Co content in the second magnetic layer versus the first magnetic layer (73 % vs. 67%). Finally, Song et al. also provides examples indicating that increased Co content results in increased Ms (*Table 1, wherein 86% Co yields a Ms of ~530 emu/cc vs. 84% Co, which yields a Ms of only ~420 emu/cc*).

Therefore, the examiner deems that one of ordinary skill in the art at the time of appellants' invention would have also been motivated to use a second magnetic layer possessing a higher Co content than the first magnetic layer in view of appellants' admissions that decreased Co results in decreased Ms, as well as the examples in Yoshikawa et al. and Song et al., especially given the teachings in Miyazawa et al. to utilize a second magnetic layer possessing a higher Ms than the first magnetic layer.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Moroishi et al. in view of Miyazaki et al. and Zhang et al. by using a first and second magnetic layer meeting appellants' claimed composition requirements as taught by Yoshikawa et al., appellants' admitted prior art and Song et al., since such compositions are a known method of achieving the relative SMNR and Ms properties required by the Moroishi et al. in view of Miyazaki et al. and Zhang et al. teachings.

Claim 6 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Moroishi et al. in view of Miyazaki et al. and Zhang et al. as applied above, and further in view of Ross et al. (U.S. Patent No. 6,156,404).

Moroishi et al. in view of Miyazaki et al. and Zhang et al. is relied upon as described above. Specifically, Moroishi et al. in view of Miyazaki et al. and Zhang et al. teach a bcc first underlayer comprising Cr and a second underlayer comprising a CrMo alloy.

Should one of ordinary skill in the art not readily envision the embodiment wherein the first underlayer comprises a Cr alloy different than the second Cr alloy, Ross et al. teach a dual layered underlayer comprising a sublayer and a Cr underlayer (*col. 4, lines 11 – 33 and col. 13, lines 33 - 37*) wherein the sublayer comprises bcc Cr or Cr alloys (*col. 7, lines 19 – 26*). Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, Ross et al. teach the equivalence of bcc Cr and bcc Cr alloys in the field of first underlayers in

a dual underlayer structure. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). The examiner notes that it would have been obvious to utilize a different alloy composition for the first underlayer and the second underlayer or the net result would simply be a single underlayer of a single composition, albeit deposited at two separate intervals. The examiner also notes that the bcc Cr alloys explicitly listed in Ross et al. for use as the first underlayer do not include CrMo (*col. 7, lines 23 – 25: "Other BCC materials include Cr with less than 30 atomic % Ti, Ni, Al, Si or Co"*), which is the alloy used as the second underlayer in Moroishi et al. (*Figure 1 and col. 7, lines 3 – 5*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Moroishi et al. in view of Miyazaki et al. and Zhang et al. to include a first and second underlayer comprising Cr-alloys meeting appellants' claimed limitations as taught by Ross et al. since bcc Cr alloys are known equivalents to bcc Cr for use as first underlayers and it would have been obvious to utilize a different alloy composition for the first underlayer and the second underlayer or the net result would simply be a single underlayer of a single composition.

(11) Response to Argument

Regarding the rejection predicated upon Ohkijima et al., appellants argue that Ohkijima et al. fails to disclose a first "magnetic" layer and that the limitation regarding

the SMNR ratio is not inherent in the prior art, primarily because the intermediate layer of Ohkijima et al. is not a true "magnetic" layer. The Examiner respectfully disagrees.

First, the Examiner notes that appellants' claims are open to any amount of magnetization for the first and second layer, provided that the second layer exhibits a larger value than the first. As shown in Table 1 of Ohkijima et al. the intermediate layer clearly exhibits some degree of magnetization and is hence a "magnetic layer". Appellants are reminded that the specification is not the measure of the invention. Therefore, limitations contained therein can not be read into the claims for the purpose of avoiding prior art. *In re Sporck*, 55 CCPA 743, 386 F.2d 924, 155 USPQ 687 (1968). None of the claims require a minimum value for Ms for the first or second magnetic layers and the specification does not define "magnetic layer" to mean anything other than a literal definition, i.e. a layer exhibiting greater than zero magnetization.

Second, the Examiner notes that SMNR is a property of many characteristics of the layer, including the alloy composition and microstructure. The CoCr intermediate layer "seeds" the magnetic layer in Ohkijima et al. and would clearly possess a crystal structure appropriate for use in a magnetic recording medium, i.e. the Examiner has no reason to believe that an extremely noisy microstructure would be used since that would produce a medium with poor overall SMNR characteristics. As such, the Examiner deems that there is sound reason to believe that since embodiment 26 is disclosed to (1) exhibit magnetism, (2) is used directly under a second magnetic layer, (3) possesses a higher Co content in the second magnetic layer, and (4) possesses a higher Cr content in the intermediate layer, it may also inherently possess the claimed functional

SMNR limitation required by appellants. However, Ohkijima et al. did not foresee to provide all possible functional/property measurements of their rightful invention and the Examiner must rely upon the Offices' ability to apply a position of inherency when a claimed functional limitation or property may (or may not) be present in the prior art. Since attorney arguments are not considered evidence, the Examiner notes that appellants have presented *no* evidence that the disclosed embodiment would not inherently meet the claimed functional limitation, merely arguing that the layer exhibiting magnetization is not a "magnetic layer".

Regarding the rejection predicated upon Moroishi et al. in view of Miyazaki et al. and Zhang et al., appellants argue that the appellants were the first to have found that when the Cr and Pt contents are increased for higher noise and improved SMNR, the Ms of the alloy is reduced (*brief – page 8, lines 4 – 8; page 9, lines 8 – 13 and 17 - 19*). Appellants further argue that the combination of references is based upon generalities and that the references are not combinable since they each teach different objective by different mechanisms. The Examiner respectfully disagrees.

First, the Examiner notes that the knowledge that is alleged to have been discovered by appellants is admitted by the very same appellants to be known in the art. "As the drive to higher and higher recording density increases, attempts have been made to achieve high coercivities by increasing the amount of platinum (Pt) in the Co-based magnetic alloys. In order to improve SMNR, the chromium (Cr) content is simultaneously increased. However, as a result of increasing both the Pt and Cr

contents, the cobalt (Co) content is decreased, thereby detrimentally impacting Ms, triggering lower amplitudes and weaker signals. In order to compensate for the diminished signal, the magnetic film can be made thicker. However, as the thickness of the magnetic film increases, the PW50 becomes wider and the resolution decreases" (*specification, page 4, lines 13 – 21*).

Second, the Examiner notes that Moroishi et al. is relied upon to teach that the base structure required by appellants is known in the art, specifically a layered recording medium possessing two magnetic layers over an underlayer structure designed for epitaxial growth of the magnetic layers. Moroishi et al. is admitted to be silent regarding the optimization of the relative magnetic layers for SMNR or Ms and appellants are reminded that "the test for obviousness is not whether features of the secondary reference may be bodily incorporated into the primary reference's structure, nor whether the claimed invention is expressly suggested in any one or all of the references, rather the test is what the combined teachings would have suggested to those of ordinary skill in the art." *Ex parte Martin* 215 USPQ 543, 544 (PO BdPatApp 1981). In the instant case, the combined teachings suggest that the lower magnetic layer *should* be optimized for SMNR (*Zhang et al. reference*) and that the upper magnetic layer *should* be optimized for Ms (*Miyazaki et al. reference*). The fact that the references rely upon singularly disclosed methods to achieve the optimization does not remove the knowledge that such optimization is desired, regardless of how one of ordinary skill would go about obtaining the improved SMNR or Ms values. The Examiner notes that appellants have even admitted that alternative methods for

optimizing SMNR and Ms are known in the art by varying alloying elements in the magnetic layers.

Finally, appellants argue that since Moroishi et al. relies upon a magnetic layer separated by an intermediate layer, it is both not combinable with Zhang et al. and fails to read on the claimed invention. The Examiner respectfully disagrees.

The Examiner notes that appellants' claims are open to additional layers being present, including non-magnetic spacer layers between the magnetic layers. Furthermore, while Moroishi et al. disclose a dual layered medium including non-magnetic spacers, the prior art clearly recognizes that dual magnetic layers can be used adjacent to each other (*e.g. Zhang et al. and Moroishi et al., col. 5, lines 37 - 40*). In addition, the Examiner notes that the spacer layers are used primarily to optimize the exchange coupling forces between adjacent magnetic domains on adjacent magnetic layers and the crystal structure of the spacer layers and magnetic layers are still extremely important for achieving good SMNR, coercivity and recording density (*Moroishi et al., col. 6, lines 28 - 40*. Therefore, the Examiner deems that the structure of Moroishi et al. is analogous to the dual layered structures disclosed by appellants and Zhang et al. and that the teachings of optimization of the SMNR and Ms values would be applicable regardless of whether non-magnetic spacer layers existed between the claimed magnetic layers.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

KMB
October 16, 2003

Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700

Conferees
Paul Thibodeau
Deborah Jones

McDERMOTT, WILL & EMERY
600 13th Street NW
Washington, DC 20005-3096

[redacted]